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Lake Sammamish State Park
Wetland, Stream and Lakeshore Restoration Plan
King County and City of Issaquah, Washington

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1. INTRODUCTION

The Watershed Company was retained by the Washington State Parks and Recreation Commission (State Parks) to prepare a *Wetland, Stream, and Lakeshore Restoration Plan* for Lake Sammamish State Park (Park) in Issaquah, Washington. This work was partially funded by a generous Wetlands Protection Grant from the United States Environmental Protection Agency. A seven-member Restoration Planning Team guided The Watershed Company in anticipation of overall Park improvement and redevelopment. This group included representatives from State Parks, City of Issaquah Parks and Recreation, City of Issaquah Public Works, Issaquah Rivers and Streams Board, and the Mountains to Sound Greenway Trust.

Lake Sammamish State Park encompasses approximately 512 acres at the south end of Lake Sammamish. The Park is within the Interstate 90/Mountains to Sound Greenway corridor and provides important recreational, open space, and wildlife habitat areas. The Park is primarily developed as a day-use facility including swimming beaches, boat launch, picnic shelters, trails, soccer and baseball fields, and the Hans Jensen Youth Group Camp. Much of the Park is undeveloped and includes meadows, vast wetlands, lakeshore areas, and Issaquah, Tibbetts, and Laughing Jacobs Creeks.

Human activity and development have affected and altered the natural resources in the Park and watershed. Early settlers cleared and farmed the area, draining wetlands and channelizing creeks. Coal mining, forestry, lowering of the winter and flood-event lake level due to Sammamish River dredging and lake outlet reconfiguration by the U.S. Army Corps of Engineers, the construction of Interstate 90, and on-going urbanization have had significant impacts on the natural systems and overall character of the Park.

Lake Sammamish State Park has been identified by government agencies (Washington State Parks, Washington Department of Fish and Wildlife, City of Issaquah), tribal organizations (Northwest Indian Fisheries Council) and non-profit organizations (Mountains to Sound Greenway Trust) as a high priority area for restoration work within the Issaquah Creek Basin and Lake Sammamish Watershed. This study identifies, evaluates, and ranks specific prospective project areas within the Park for restoration of natural lands including wetlands, streams, shorelines, floodplain areas, and associated buffers. This plan is to be used in conjunction with other planning efforts underway for Lake Sammamish State Park, including the *Facilities Development Plan* (FDP), *Master Development Plan* (MDP), and *Classification and Management Planning Project* (CAMP).

2. PURPOSE

As mentioned above, Lake Sammamish State Park is an important feature in the overall Issaquah Creek Basin, shown in Figure 1. The Issaquah Creek Basin is within the Lake Sammamish Watershed, encompassing 61 square miles and including all forks and tributaries of Issaquah and Tibbetts Creeks. Approximately 80 percent of the basin is forested, including 25,500 acres of public land (Grand Ridge Park, Tiger Mountain State Forest, King County Taylor Mountain Forest, Squak Mountain State Park and Cougar Mountain Regional Wildland Park) and adjacent rural lands. The remainder of the basin is pastures, fields, wetlands, or developed. The mixed deciduous/coniferous forests, streams, wetlands, and fields provide significant habitat values for a wide range of aquatic and terrestrial species.

Lake Sammamish State Park is a critical element of the on-going protection and stewardship/restoration efforts in the basin, because of its prominent location at the mouth of Issaquah Creek. The large area is an oasis of open space in the midst of the quickly developing areas of Issaquah and East King County. The Park provides spaces for passive and active recreational activities and significant areas of lowland wildlife habitat, not often present in urban or suburban areas. This valuable resource is an important link in connecting people to open space and natural ecosystems.

This plan proposes to build on this value by restoring and enhancing the natural systems within the Park to make these areas more useful to both human and wildlife users. A complex mosaic of native plant communities and habitats is envisioned that provides the basic requirements of food, cover, and water to a diverse assemblage of native wildlife types. The open character of the Park will be maintained with pockets of native trees and shrubs dispersed throughout in a manner to maximize edge habitat values and wildlife use. These areas are planned in a way to interface with humans that is useful, respectful and low impacting.

The primary ecological need of the Park is to increase overall biodiversity in terms of plant communities and land cover types, which in turn will enhance and encourage use by a variety of native wildlife species. Removal and management of invasive plant species, revegetation with native plant communities, fish habitat improvement, and wetland functions restoration are the means to achieving this result. This study has evaluated the Park holistically in terms of restoration potential. It details park-wide recommendations and presents a menu of interrelated site-specific projects to address overall ecological needs. Site-specific projects can be mixed and matched to create opportunities for volunteer efforts, grant funded professionally managed restoration work, and compensatory mitigation projects.

Issaquah Creek is used by a number of salmonid fish species including chinook, coho, and sockeye salmon (including kokanee), cutthroat and steelhead trout, and, occasionally, bull trout. Large numbers of adult coho and chinook salmon return to the State salmon hatchery a few miles upstream of the park each year. A variety of non-salmonid fish species use the creek as well. Since Lake Sammamish State Park

includes the mouth and lowermost mainstem section of the creek, it serves as the gateway for all of the migratory fish using the entire basin. All such fish successfully completing their life history through hatching, rearing, attainment of maturity, and reproduction to sustain future generations must pass through the park and experience the habitat it provides, in whatever condition, at least twice during their lives. This makes it critically important to ensure that these valuable fish experience suitable and high-quality habitat as they pass through and also if they choose to rear in the park for an extended period. Fish habitat improvement projects in other locations are seldom guaranteed such a high level of use, making such improvements in the park critically important as well as efficient in terms of benefits to fish for money spent and effort expended.

Other restoration efforts are underway in the basin to the benefit of salmonid fish and wildlife in general, including work along Tibbetts Creek, Issaquah Creek, and Laughing Jacobs Creek upstream of the Park boundaries. The Tibbetts Creek Greenway is nearly complete with work done on City of Issaquah properties, private lands owned by Rowley Enterprises, and parklands restored as part of Washington Department of Transportation mitigation efforts. Restoration work along the banks of Issaquah Creek has also been completed recently just outside the Park boundary on private property. King County has implemented stream and wetland restoration work along the upper reaches of Laughing Jacobs Creek within the Hans Jensen Youth Group Camp.

The City of Issaquah and King County have long recognized the value of the Issaquah Creek Basin, not only as habitat for salmonid fish, but also for the other wildlife species dependent upon the creek corridor and upland areas. The City and County are active participants in the Lake Sammamish–Issaquah Creek Waterways Program and Issaquah Basin Action Team. Through these programs, the agencies have implemented a coordinated effort for property acquisitions, placement of conservation easements, and stewardship/restoration projects along Issaquah and Tibbetts Creeks. The major acquisitions have included the purchase of Taylor Mountain Forest at the headwaters of Issaquah Creek (Holder and Carey Creeks), Log Cabin Reach, South Issaquah Creek Greenway, Issaquah Creek/Cybil-Madeline Park as well as many other smaller acquisition sites along the creek corridor.

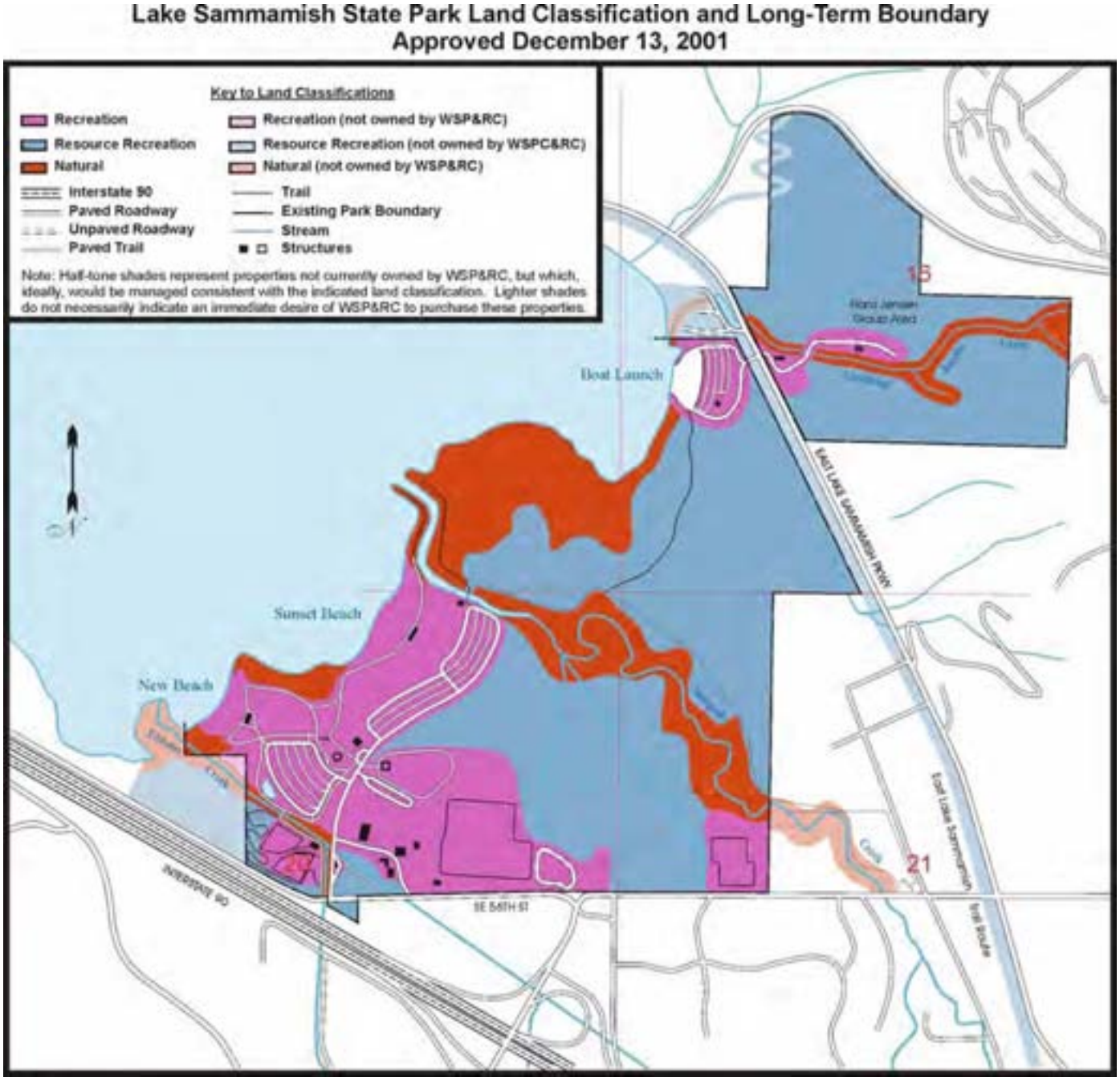
Additionally, in an effort to protect the surrounding forested areas and public lands, the City of Issaquah, King County, Washington State Department of Natural Resources, and Washington State Parks and Recreation Commission have partnered as the “Issaquah Alps” and Upper Snoqualmie River Valley Interagency Committee in order to acquire critical properties to protect water quality and preserve wildlife habitat and corridors.

The *Lake Sammamish Classification and Management Planning Project* (CAMP) classified the Park as a combination of Natural, Resource Recreation, and Recreation Areas. The *Lake Sammamish State Park Land Classification and Long-Term Boundary Map* from this project is included here as Figure 2. The CAMP map shows the land classifications as defined in the *Lake Sammamish State Park Area Management Plan* (August 2003). The majority of undeveloped lands are classified as Natural (red) and

Resource Recreation (blue) Areas. Recreational use and development in the Natural Areas are limited to low-intensity, such as bank fishing (if and when allowed), pedestrian trails, and interpretive displays. The Resource Recreation Areas are for recreational use and development is limited to low and medium-intensity levels, such as primitive sanitary facilities and shared use trails. The Natural and Resource Recreation classifications provide high and moderate degrees of protection, respectively, for native plant and animal communities. Existing high-intensity Park developments are classified as Recreation Areas (purple). The restoration plan has been developed in the context of these natural resource policies and planning efforts underway for future development of portions of the Park.

Figure 1. Issaquah Creek Basin Map.

Figure 2. Lake Sammamish State Park Land Classification and Long-Term Boundary.



3. METHODS

This *Wetland, Stream, and Lakeshore Restoration Plan* was initiated with a review of existing information provided by State Parks, including maps, aerial photos, resource inventories of wetlands, soils, flooding, and other natural processes, as well as goals and management issues identified through other planning efforts. The review was followed up with a comprehensive and systematic on-site evaluation of the Park, which resulted in a preliminary list of restoration project ideas. After input and initial review from the Restoration Planning Team, additional field work was conducted to complete the evaluation of the Park and to further define projects, both Park-wide and site-specific.

The entire length of Issaquah Creek within the Park was inventoried, photographed, and evaluated for development of restoration plans. Tibbetts Creek, Laughing Jacobs Creek, and lakeshore areas were similarly evaluated. Earlier in the year, The Coot Company, wetland scientists, identified and delineated wetlands mainly within the developed areas of the Park (January 2005). This report was reviewed and used as a guide with aerial photos for on-site evaluation of wetlands. Other recent wetland studies have been done by Washington State Department of Transportation (April and December 2003), primarily in the Tibbetts Creek area of the Park.

Proposed projects were defined as Wetland (W), Stream (S), Lakeshore (L), Upland (U), and/or Recreation (R) projects, with most being a combination of several types. Wetlands in the Park associated with prospective projects were evaluated using the *Wetland and Buffer Functions Semi-Quantitative Assessment Methodology* (Cooke Scientific Services 2002). Existing wetland functions such as flood/storm water control, shoreline protection, water quality, habitat functions, and cultural/socioeconomic opportunities were analyzed and scored as low, medium, or high in value. This methodology also allows for prediction of eventual scores based on proposed habitat enhancements. This information is summarized in specific project descriptions and the detailed worksheets are included in Appendix B.

After identifying and describing projects throughout the Park, the site-specific items were ranked using evaluation criteria developed and compiled on a questionnaire form. Evaluation criteria included issues such as site accessibility, potential for fish and wildlife habitat improvement, water quality, hydraulic impacts, ease and cost of construction, suitability for educational purposes and community involvement, expected life of project, regulatory requirements, aesthetics, public access, and recreational opportunities. Scoring was based on assumptions and project understanding within the context of conceptual level project elements, needs, and requirements. Provision for a weighting factor was included in the event that it was appropriate to give certain criteria more or less emphasis than others; however, the weighting factor was not used and each of the criteria were ultimately given equal weight. There is also a provision for any overriding, compelling reasons to either do or not do a particular project. This provision and the weighting factor could be used in the future to select and match particular

projects to specific funding sources or to address priority needs and interests as they are identified.

Projects were separated into three "Implementation Groups" based on their anticipated level of required permitting, as follows. Consequently, this also divided the projects into groupings that target similar types of restoration actions and functional benefits; projects with extensive grading and/or in-stream work tend to require the most permitting.

A. Limited permitting. This designation is used for projects which primarily involve removal of invasive vegetation and replanting with native species. Proposed site preparation and planting plans will need to be reviewed by local regulatory agencies (City of Issaquah or King County) to assure that plans have been prepared by a qualified biologist, but are not expected to require state or federal permits. Most of these projects could be implemented by supervised volunteer groups.

B. Moderate permitting. This group of projects will require some additional permits and regulatory review, such as Washington Department of Fish and Wildlife Hydraulic Project Approval for installation of log structures. These projects generally target removal of invasive plants, streambank revegetation, and installation of in-stream log structures and woody debris for fish habitat. Trail improvements are also elements of some of these projects. Grading permits from King County or City of Issaquah may be required for features such as the creation of small depressions or widening of the floodplain along Issaquah or Tibbetts Creeks. As above, supervised volunteer groups could participate in the clearing, trail building, and revegetation portions of these projects.

C. Extensive permitting. These projects will require more complicated permitting on the local, state, and federal levels. They are multi-faceted projects which target larger scale natural resource processes and overall ecological restoration goals. Many of these projects may be suited for implementation as mitigation projects, and possibly as mitigation banks. As above, supervised volunteer groups may be able to participate in some of the clearing, trail building, and revegetation portions of these projects. Also see Section 4, Regulatory Considerations.

Final rankings for project priorities are within each of these groups. An example of the ranking form is included as Figure 4 and overall ranking results are summarized in Table 1, both in Section 8 of this report. The ranking forms with tallied scores for each project are included in Appendix A.

Example cost estimates were prepared for six projects, three from Implementation Group A and three from Implementation Group B, as requested by the Restoration Planning Team. These six projects are among the top-ranked projects in each of these two groups, and were chosen to be representative of a wide range of project types including stream, wetland, and lakeshore elements. The estimated costs are included on the applicable project pages and cost worksheets are included in Appendix C.

Each proposed project is also identified with GIS coordinates, its project type designation(s) (Wetland, Stream, Lakeshore, Upland, Recreation), and Implementation Group (A - Limited permitting, B - Moderate permitting, C - Extensive permitting). This information is included on the site-specific project pages and in Appendix E.

4. REGULATORY CONSIDERATIONS

Restoration projects within the Park will fall under the jurisdiction of several different local, state, and federal agencies. Most of the Park is within unincorporated King County, with the exception of the far west extension along the mouth of Tibbetts Creek, which is in the City of Issaquah.

Applicable City of Issaquah regulations include the Critical Areas Ordinance. Wetlands and streams are each classified according to three-tiered rating systems with required buffer widths ranging from 25 feet to 100 feet. Shoreline permits and grading permits may also be required, depending on the elements of the proposed project.

King County recently adopted a new Critical Areas Ordinance in November 2004. These regulations include a new system for categorizing wetlands and streams and assigning their buffers. There are four wetland categories with buffer widths ranging from 50 to 275 feet. Streams are grouped with lakes and ponds and called “aquatic areas.” There are four categories with buffer widths ranging from 25 to 165 feet. King County shoreline permits and grading permits will also be required where applicable.

Review under the State Environmental Policy Act (SEPA) is required to assure that the environment is given appropriate consideration in state and local permit decisions. Environmental checklists are required for use in making threshold determinations, such as Determination of Non-Significance (DNS) or need for an Environmental Impact Statement (EIS). The State Park serves as its own lead agency and SEPA responsible official.

Washington Department of Fish and Wildlife Hydraulic Project Approval (HPA) would be required for any in-stream work such as installation of habitat log structures or grading to create additional floodplain area. Washington Department of Ecology oversees shoreline permit decisions made at the local level and administers the 401 Water Quality Certification in support of the Corps 404 program (see below).

Federal permitting through the U.S. Army Corps of Engineers is necessary for the discharge of dredged or fill materials into waters of the United States under Section 404 of the Clean Water Act. Section 10 of the Rivers and Harbors Act may also be triggered if any work is conducted in or over Lake Sammamish, a navigable water. Under the federal Endangered Species Act, projects requiring a federal permit or receiving federal funds will also be reviewed by the National Marine Fisheries Service (NOAA Fisheries) and U.S. Fish and Wildlife Service (USFWS) if the proposed project may have an effect on listed fish or wildlife. A Biological Evaluation will need to be prepared to support the federal authorizing or funding agency’s consultation with NOAA Fisheries and USFWS.

5. NATURAL RESOURCE PROCESSES

The morphology of the Lake Sammamish area was formed by continental glaciers that, at their maximum extent, likely covered the Issaquah area with over 3,000 feet of ice. As the glaciers retreated, a much larger Lake Sammamish emerged, initially discharging *southwards* through the present day Issaquah Creek and Tibbetts Creek corridors. The retreating edge of the glacier formed an ice dam preventing flow from exiting to the north, as it does now. Over time, as the ice continued to retreat, the discharge location of the lake shifted temporarily to the northwest to the Eastgate Channel, which is the present-day location of Interstate 90. Large deltas began to form at Issaquah Creek, Tibbetts Creek, and other drainages on the east side of the lake. Eventually, the glaciers receded sufficiently such that that meltwater stopped entering the basin, lower elevation discharge pathways to the north along the Sammamish River alignment opened up, and the lake reduced in size to near its present configuration (Booth 1990).

The Park is located on a large delta deposit which had likely been built primarily by Issaquah Creek, but also with contributions from both Tibbetts and Laughing Jacobs Creeks. Typical of delta deposits, the land slopes very gently towards the lake, and the soils are primarily fine-grained sands and silts. There is also a smaller area of the Park northeast of the delta on moderately sloped ground east of East Lake Sammamish Parkway. Soils were identified in the King County Soil Survey and presented in the wetland inventory done by The Coot Company (2005). This information is included in Appendix D of this report. Eleven different soil types are identified within the Park, four of which are considered hydric soil types.

During historic times, the U.S. Army Corps of Engineers altered the outlet of Lake Sammamish. The Corps dredged the channel of the Sammamish River and installed a weir at the outlet of the lake. The result of this activity was a significant reduction in the peak winter water levels of the lake, though non-flood lake levels were largely unaltered.

Issaquah Creek, and to a lesser extent Tibbetts Creek, appear to have downcut significantly in recent years, which has led to over-steepened and less stable banks. Downcutting is a typical response of a stream in an urbanized basin, however in this case downcutting may have been exacerbated by the alteration of the lake's water level regime.

Large side channel or backwater creation projects across the former, broad flood plain of Issaquah Creek were considered in this study, but not carried forward. The reason for this is that it is perceived, as explained above, that the creek has downcut due to the lowering of the Lake Sammamish high-pool elevation. A new, lower but narrower flood plain for the creek appears to be in the process of forming. As such, the stability and predictability of such projects would be uncertain.

When a stream meets a body of water, it loses energy and can no longer erode its bed or banks. Instead, a stream deposits the material it has been carrying, forming a delta. The elevation of the receiving water is called the base level of the stream. A stream

erodes its bed until it forms a stable gradient to match the base level, and the stream cannot erode below that base level.

Streams do most of their erosion and deposition during flood events. Historically, most floods would likely have corresponded with peak lake levels, which alter the base level that the stream can erode to. Therefore the stream would have formed its gradient to the higher lake level that existed prior to the Corps manipulation. When the Corps altered the peak lake level by several feet, the bed of the stream may have begun eroding to compensate for the difference.

A map depicting the general location of the floodway and floodplain areas within the Park is also included in Appendix D of this report.

6. FISH & WILDLIFE CONSIDERATIONS

A data search of the Washington Department of Fish and Wildlife Natural Heritage System and Priority Habitats and Species database was performed as part of the wetland inventory done by The Coot Company (2005). Four items were identified, as follows.

- All of the Lake Sammamish State Park lands within King County jurisdiction are listed as Urban Natural Open Space (UNOS).

- The active great blue heron colonial nesting site (heronry) is identified along the north lakeshore of the Park.

- The database shows a bald eagle polygon across the northern portion of the Park that is apparently associated with a nest site near the lake.

- Priority anadromous fish are listed for both Tibbetts and Issaquah Creeks.

The Washington Department of Fish and Wildlife's Issaquah Salmon Hatchery lies along Issaquah Creek at River Mile 3.1, a relatively short distance upstream of Lake Sammamish State Park. The hatchery produces primarily coho and chinook salmon. Given the hatchery's situation along the creek relative to the Park, thousands of adult salmon pass through the Park in the process of homing to the hatchery each year and correspondingly larger numbers of juveniles, at least an order of magnitude larger, pass downstream in the process of migrating to sea. As such, Issaquah Creek habitat within the Park is used by and is important to huge numbers of salmon. Adult upstream migrants need places to rest and hide from predators, as do juveniles. Some adult fish inevitably stop short of reaching the hatchery to spawn, so suitable spawning habitat below the hatchery, including sections within the Park, are in high demand. Downstream juvenile migrants as well as some juveniles who rear for longer periods within the Park need functional rearing habitat. Proposed habitat improvement projects within the Park address these needs by providing bank stabilization to reduce turbidity and fine sedimentation of spawning gravels and by the placement of large woody

objects in and along the creek to scour and maintain rearing and resting pools and to provide cover from predation within those pools.

The *Lake Sammamish State Park Area Management Plan* (2003) includes policies regarding protection of natural plant and animal communities such as the great blue heronry, and for control of nuisance wildlife such as Canada geese. These policies stipulate coordination with other natural resource agencies in terms of restoration planning, protection strategies, and interpretive opportunities.

Project A8 of this study addresses restoration of the field south of the great blue heron colonial nesting site. It is recommended that upland forest and shrub patches be installed in this area to increase habitat diversity while still maintaining the views of the heronry. Interpretive signage along the trail is also recommended to enhance awareness of this special feature and explain the need for protection.

An action plan for control of Canada geese has been prepared by Park staff in coordination with other natural resource agencies. This plan includes a variety of management prescriptions. Many of the project recommendations presented here are consistent with these goals, in that increased native plant communities and habitat diversity will discourage use by geese, since they tend to congregate on expanses of lawns and open areas.

7. PARK-WIDE RECOMMENDATIONS

Invasive Plant Management

Many areas of the Park have become dominated by non-native, invasive vegetation. In the past, much of the Park property was used for agriculture, involving primarily hayfields and pasturelands. Native woody vegetation was cleared, and extensive ditching was done to manage water levels. These now-abandoned fields have become dominated by invasive species, particularly reed canarygrass and blackberries (both Himalayan and evergreen). These species are common in other areas of the Park as well, including stream banks, riparian areas, wetlands, and some lakeshore sections. There are also some fairly extensive stands of Japanese knotweed along the upper reaches of Issaquah Creek.

Monocultures of non-native invasive plants are detrimental to the overall ecosystem because they crowd out and compete with the native vegetation that provides for the specific needs of many native wildlife species. When these non-native plant communities dominate, there are less food and cover opportunities for native wildlife and consequently, non-native, often nuisance types of wildlife will flourish and further diminish the ability of native species to be successful.

As explained in Section 2, the *Lake Sammamish Classification and Management Planning Project* (CAMP) classified the Park as a combination of Natural, Resource Recreation, and Recreation Areas; see Figure 2. The areas shown in blue are the former agricultural fields and emergent wetlands that are classified as Resource

Recreation Areas. It is these areas that are most in need of invasive plant control. Many of the red areas, which are generally streams, riparian areas, and undeveloped shorelines are also dominated by invasive plants. Specific descriptions of existing conditions and proposed actions are included in the site-specific project recommendations in Section 8.

In general, non-native invasive plant species in sensitive areas should be removed initially and primarily through mechanical means. This could include removal with mowing or excavating machinery where feasible and/or through hand-pulling and grubbing where the use of such equipment is not feasible or as a supplement to machine work. The goal is to remove the rootstocks to the greatest extent possible.

Chemical means for control and eradication may be appropriate in some areas, where allowed by local regulations. Further recommendations for control of invasive plants may be obtained from the King County Noxious Weed Control Program. A comprehensive integrated vegetation management program, including mechanical, biological, and chemical controls, should be developed for the Park.

Blackberry control can be achieved by digging out roots and old canes repeatedly, over several growing seasons, with follow-up plantings to shade and out-compete new shoots. When choosing the size of project to tackle, it is best to choose a smaller area that can be maintained as opposed to choosing a bigger one that will be reclaimed by the blackberries.

Reed canarygrass can also be weakened over time to some extent with shading and competition through installation of dense and fast-growing species, such as willows. Mowing is also effective in holding back reed canarygrass, as is evident in existing mowed sections of the Park. Large-scale reed canarygrass removal is usually more successful with grading and removal of roots and sod. Creation of more varied topography and dense plantings of aggressive and fast-growing native plants help to combat re-establishment.

With Japanese knotweed, injecting individual stalks with herbicides has been successful in some local applications. When using mechanical removal of this species, it is particularly important to try and remove all rootstocks as they readily re-sprout and grow. It is especially important to avoid inadvertently facilitating the spread of this plant through improper transport and disposal of excavated root materials.

Long-term monitoring and maintenance is required to keep invasive plants in check, and to promote the establishment of newly installed native plantings. See Monitoring and Maintenance section below.

Trail System, Educational and Interpretive Elements

There is a general need to better define trails and connections throughout the Park. Maps for trail users would be helpful and could be tied to existing and future interpretive information. Overall maps with “You Are Here” locators would be very helpful in orienting visitors to this very large Park.

Other specific changes in the existing trail system would be beneficial as well. For example, Project B7 details proposed changes to the trail at the mouth of Tibbetts Creek. This trail should be improved to maintain the popular access point, while at the same time protecting, enhancing, and minimizing foot traffic impacts to the sensitive wetland, stream, and lakeshore habitats. A new trail segment coupled with an interpretive area in an old oxbow of Issaquah Creek is proposed in Project B9.

Sensitive areas, such as the great blue heron colonial nesting site (heronry), should be avoided. Views and interpretive information are appropriate and can be provided from the existing trail at a distance, but any closer access to this area should be avoided to prevent disturbance to the nesting birds. The lakeshore wetlands, in particular, tend to provide secluded habitats for more secretive and sensitive types of wildlife, such as the herons, other shorebirds and aquatic mammals.

Other trail recommendations are detailed in the site-specific project descriptions. In general, on-grade trails through upland areas in meadows or open forests are preferable to trails in wetlands, which can be hard to maintain and difficult to use in certain times of the year. Where trails are appropriate in wetlands, boardwalks may be better suited to both protect the wetland and to focus use by park visitors.

Fencing is also recommended in some locations where restoration is to take place adjacent to high use areas; see specific project descriptions in Section 8. This is an effective way to discourage people from entering newly planted areas until vegetation becomes established. Fencing can also be done in aesthetically pleasing and sensitive ways, such as split rail fencing, to create a strong sense of value and provide a focal point for interpretive signage.

Other opportunities for educational and interpretive signage are detailed throughout the site-specific projects. The diverse ecosystem and varied recreational features of Lake Sammamish State Park make this a particularly valuable educational opportunity. Interpretive signage in and adjacent to high use areas such as the beaches, picnic areas, soccer and baseball fields can raise awareness and appreciation for the unusual nature of this large park. Interpretive signage can explain the value and function of small pockets of native vegetation in non-natural areas of the Park, and will also build public support and understanding of large-scale restoration efforts. Item 16 of the project ranking forms addresses educational and interpretive uses; see Table 1 and Appendix A.

The CAMP map (see Figure 2) shows the land classifications of Natural, Resource Recreation, and Recreation Areas, as defined in the *Lake Sammamish State Park Area Management Plan* (August 2003). The majority of undeveloped lands are classified as Resource Recreation and Natural Areas. Recreational use and development in the Natural Areas are limited to low-intensity, such as bank fishing (if and when allowed), pedestrian trails, and interpretive displays. The Resource Recreation Areas are for recreational use and development is limited to low and medium-intensity levels, such as primitive sanitary facilities and shared use trails. The Natural and Resource Recreation

classifications provide high and moderate degrees of protection, respectively, for native plant and animal communities. The proposed site-specific projects are consistent with these defined uses.

Monitoring and Maintenance

Post construction monitoring and maintenance is critical to the long-term success of restoration projects. Specific requirements and targeted performance standards are usually prescribed as conditions of permit approval. Typically, five or more years of performance monitoring are required with benchmark standards of success. For example, 90-100% survival of installed plants is often required after one year with a guarantee of replacement of dead plants. Plant coverage is usually the standard measure for success in subsequent years. This can be measured in a variety of ways, such as circular sample plots, line intercept transects, or belt transects, depending on type and age of the plant community. Percent coverage of native and non-native vegetation is tracked throughout the monitoring period. If standards of success are not met, contingency plans are developed to address alterations in hydrologic regime, soil, plant species, or other applicable features.

Regular maintenance is also necessary to keep invasive plants in check as native plantings become established. This often involves several visits during the growing season to remove weeds and clear areas around installed plantings. The first few years are critical to the long-term success of restoration and revegetation. Maintenance needs for the site-specific projects are addressed in Item 21 of the project ranking forms and summarized in Table 1. See also Appendix A.

Some monitoring and maintenance activities could be performed by trained volunteers, depending on the size of the project and regulatory requirements. For example, tracking success of revegetation in many of the Group A and B projects could be accomplished in this way. Installation and maintenance of plant guards to protect young vegetation from deer, beavers, and other small rodents could also be performed by volunteer groups.

Larger, more complex projects, such as those described in Group C will likely have more comprehensive and sophisticated monitoring requirements. However, large projects that include changing the landscape with grading and/or changing the hydrologic patterns may be more self-sustaining after the initial establishment period. For example, plugging of old farmer's ditches and restoration of wetland hydrologic patterns will result in re-establishment of more natural processes and functions, and consequently stable native plant communities.

8. SITE-SPECIFIC RECOMMENDATIONS

Thirty-eight specific restoration projects have been identified through this study. These are shown on the Overview map (Figure 3) and are detailed in the following project pages. These recommended projects have been planned within the context of the existing and programmed uses determined through the Natural Resource policies of the Park.

These projects cover areas throughout most of the park property. As mentioned above, King County has completed some restoration and enhancement work on the upper reaches of Laughing Jacobs Creek within the Hans Jensen Camp area of the Park. Monitoring and maintenance of this work are ongoing. There is a recognized need to extend this type of work on the lower reaches and mouth of Laughing Jacobs Creek. However, much of this area is off of Park property and was therefore not considered within the scope of this study.

As explained in Section 3 of this report, the site-specific projects were ranked within each of three Implementation Groups. The projects are presented within these groups and in order from highest to lowest priorities. Table 1 summarizes this information. Figure 4 is an example of the ranking form used. Ranking forms for each project are included in Appendix A of this report.

Projects can be grouped together to capitalize on invasive weed control and long-term maintenance benefits. Some projects would benefit from the implementation of others in close proximity in terms of increasing similar functions and values within a larger area. This is reflected in Items 17 and 18 on the ranking sheets; see Table 1 and Appendix A. Projects may also be combined to capitalize on funding opportunities. The projects do not overlap and do not preclude the implementation of adjacent projects as opportunities arise. However, it is important to consider the proposed elements of each specific project in terms of planning and phasing of construction. For example, proposed revegetation should occur after proposed grading and/or installation of in-stream log structures is accomplished, so as not to disturb newly planted areas.


LEGEND:
GROUP A Minimal permitting
GROUP B Moderate permitting
GROUP C Extensive permitting
Boat Launch
East Lake Sammamish Pkwy
Sunset Beach
New Beach
Tibbetts Creek
Interstate 90
SE 56th St.
Issaquah Creek
A2
A5
B2
A8
C8
A6
B9
A11
A3
C7
C5
B6
A13
A12
A7
C3
B10
B1
B7
A15
C10
C6
C2
A17
B3
C9
A4
A9
C1
C4
A1
A10
B8
A9
A18
A14
B4
A1
A16
B5

Figure 4. Example Ranking Form

EVALUATION FOR _____

AT LAKE SAMMAMISH STATE PARK

(Site name/number and proposed project, e.g. Site 3, NB stn. 197.48, storm grate.)

In Section A, rate the site, AS IT CURRENTLY EXISTS. In Section B, rate the PROPOSED REHABILITATION PROJECT for the site. Multiply each rating by the weighting factor, if any, to determine the total score. When each site/project has been rated, those with the highest scores should be given the highest priority.

Category: ☐ **Wetland (W)** ☐ **Stream (S)** ☐ **Lakeshore (L)** ☐ **Upland (U)** ☐ **Recreation (RE)**

SECTION A: Current site conditions	**Rating**	**Weighting Factor**	**Total**
1. Accessibility for construction (easily accessible = 5, poorly accessible = 0)			
2. Is there potential for habitat improvement? (yes = 5, no = 0)			
3. Status of site regarding fish migration (highly impacted = 5, unimpacted = 0)			
4. Status of site regarding fish &/or wildlife habitat (highly impacted = 5, unimpacted = 0)			
5. Potential for bed & bank stability improvement (high = 5, low = 0)			
6. Urgency to stop impacts/prevent damage, including flooding (urgent = 5, not urgent = 0)			
SECTION B: Proposed rehabilitation project			
7. Benefits to fish & wildlife habitat (high = 5, low = 0)			
8. Benefit to water temperature (high = 5, low = 0)			
9. Benefit in terms of decreasing sediment supply (high = 5, low = 0)			
10. Benefit in terms of water quality (excluding temp. and turbidity) (high = 5, low = 0)			
11. On-site hydraulic impact (will dissipate energy or will armor/protect site = 5, will provide no protection = 0)			
12. Up- and downstream hydraulic impacts (will reduce energy = 5, will not affect up- or downstream portions = 0)			
13. Constructability (easy = 5, difficult = 0)			
14. Long-term stability/life of project (stable = 5, unstable = 0)			
15. Possibility of cost sharing with other funding sources (high = 5, low = 0)			
16. Amenable to education or interpretive uses (yes =5, no = 0)			
17. Is the success of other projects dependent on this project? (yes =5, no = 0)			
18. Is the success of this project dependent on the implementation of other projects? (no = 5, yes = 0)			
19. Regulatory requirements (simple permitting = 5, difficult permitting = 0)			
20. Relative cost effectiveness (high = 5, low = 0)			
21. Relative maintenance/repair costs (low = 5, high = 0)			
22. Is project amenable to community involvement? (yes = 5, no = 0)			
23. Potential for flow control/detention (high = 5, low = 0)			
24. Benefits to aesthetic values (high = 5, low = 0)			
25. Benefits for public access and recreational opportunities (high = 5, low = 0)			
GRAND TOTAL:			

- **Is there any overriding and compelling reason to do this project?** ☐ **No** ☐ **Yes**
- **Is there any overriding and compelling reason to *not* do this project?** ☐ **No** ☐ **Yes**

Describe: _____

Table 1. Lake Sammamish State Park Priority Ranking.

		Priority Ranking																	
		A																	
Project #		A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13	A14	A15	A16	A17	A18
Score		66	65	64	62	61	61	58	57	55	54	53	52	52	49	48	47	47	39
		Rating for Each Site																	
		Site Number																	
		A1	*A2*	*A3*	*A4*	*A5*	*A6*	*A7*	*A8*	*A9*	*A10*	*A11*	*A12*	*A13*	*A14*	*A15*	*A16*	*A17*	*A18*
Question Number	***1***	4	4	5	5	5	5	5	4	5	5	3	3	4	4	5	5	3	5
	2	3	3	4	3	3	4	4	3	4	2	3	4	3	3	3	3	3	2
	3	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	4	2	3	4	3	3	4	4	4	4	3	4	3	3	3	0	2	4	4
	5	1	3	1	1	1	1	0	0	0	0	0	1	0	0	0	0	0	0
	6	1	2	1	1	2	1	1	0	0	1	0	1	1	1	1	1	0	1
	7	4	3	4	2	3	3	3	3	1	2	3	3	3	3	3	2	3	2
	8	3	1	1	1	1	2	0	0	0	0	0	1	0	0	0	0	0	0
	9	1	1	1	1	1	1	0	0	0	0	0	1	0	0	0	1	0	0
	10	1	1	1	2	1	2	2	0	0	0	0	1	0	0	0	1	0	0
	11	3	2	2	0	1	1	0	0	0	0	0	1	0	0	0	0	0	0
	12	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	13	4	5	5	5	4	3	5	4	5	5	3	3	4	3	5	4	3	5
	14	4	3	3	4	3	3	4	4	4	4	4	3	3	3	4	3	4	3
	15	4	3	2	2	4	4	2	3	3	2	3	2	2	2	1	2	2	0
	16	3	5	4	3	3	4	2	4	1	4	3	1	4	3	2	2	2	1
	17	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	18	5	5	5	0	5	5	5	5	5	1	5	5	5	5	5	5	5	5
	19	5	5	5	5	5	4	5	5	5	5	5	5	5	5	5	5	5	5
	20	4	3	5	5	4	3	4	4	3	5	4	4	4	3	5	3	3	2
	21	3	2	3	4	3	3	3	4	4	4	4	3	3	3	3	2	3	2
	22	4	5	5	5	3	3	4	5	4	3	4	3	4	3	2	2	3	0
	23	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	24	3	4	3	4	3	3	3	3	3	3	3	2	2	2	3	3	2	2
	25	2	1	0	3	1	2	2	2	4	5	2	2	2	3	1	1	2	0
Total		**66**	**65**	**64**	**62**	**61**	**61**	**58**	**57**	**55**	**54**	**53**	**52**	**52**	**49**	**48**	**47**	**47**	**39**

Table 1. Lake Sammamish State Park Priority Ranking (continued).

		Priority Ranking									
		B									
Project #		**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**B8**	**B9**	**B10**
Score		71	70	70	64	64	63	62	54	54	49
		Rating for Each Site									
		Site Number									
		B1	***B2***	***B3***	***B4***	***B5***	***B6***	***B7***	***B8***	***B9***	***B10***
Question Number	***1***	3	5	3	5	5	3	4	5	4	3
	2	4	4	4	3	3	4	3	3	2	2
	3	1	1	1	1	0	1	0	0	0	1
	4	3	3	3	4	3	3	3	4	2	3
	5	4	3	4	3	3	2	3	0	0	2
	6	2	2	2	1	2	1	3	0	0	0
	7	4	4	4	3	3	4	3	3	2	1
	8	2	1	2	3	2	2	1	0	0	1
	9	3	2	3	2	2	2	2	0	0	0
	10	2	1	2	2	3	2	1	1	0	0
	11	3	2	3	4	2	4	2	0	0	0
	12	2	1	2	1	2	3	0	0	0	0
	13	4	4	4	4	3	3	4	4	5	3
	14	3	4	3	3	5	4	3	4	4	5
	15	4	4	4	2	4	4	2	2	3	3
	16	3	4	3	3	3	3	4	4	5	4
	17	1	1	1	0	1	1	0	0	0	0
	18	2	5	2	5	4	1	5	0	5	2
	19	4	3	4	3	3	3	3	4	4	3
	20	4	4	4	3	1	4	4	4	4	3
	21	3	3	3	3	3	3	3	3	4	4
	22	5	3	4	2	3	2	2	4	4	1
	23	0	0	0	0	0	0	0	0	0	0
	24	3	3	3	3	3	3	3	4	1	3
	25	2	3	2	1	1	1	4	5	5	5
Total		**71**	**70**	**70**	**64**	**64**	**63**	**62**	**54**	**54**	**49**

Table 1. Lake Sammamish State Park Priority Ranking (continued).

		Priority Ranking									
		C									
Project #		**C1**	**C2**	**C3**	**C4**	**C5**	**C6**	**C7**	**C8**	**C9**	**C10**
Score		79	77	74	72	72	72	71	70	62	42
		Rating for Each Site									
		Site Number									
		C1	***C2***	***C3***	***C4***	***C5***	***C6***	***C7***	***C8***	***C9***	***C10***
Question Number	***1***	3	3	3	4	3	3	3	4	2	2
	2	4	4	4	5	4	4	4	5	4	3
	3	1	1	1	2	1	1	1	0	1	0
	4	4	4	4	4	4	4	4	4	3	3
	5	5	5	5	3	5	5	5	0	4	0
	6	4	4	4	2	4	4	4	2	2	1
	7	4	4	4	5	4	4	4	5	4	4
	8	2	2	2	2	2	2	2	2	2	0
	9	4	4	5	2	4	4	4	1	3	0
	10	2	2	2	2	2	2	2	2	2	1
	11	5	5	5	3	5	5	5	1	4	0
	12	3	3	4	0	3	3	3	1	0	0
	13	2	2	2	4	2	2	2	3	2	2
	14	4	4	4	3	4	4	4	3	4	3
	15	4	4	4	4	4	4	4	4	4	3
	16	4	4	3	4	3	3	3	4	2	2
	17	2	2	2	0	2	2	1	0	1	0
	18	4	2	2	5	2	2	2	5	5	0
	19	2	2	2	1	2	2	2	2	2	2
	20	3	3	3	3	3	3	3	4	2	4
	21	3	3	3	2	3	3	3	3	2	3
	22	3	3	2	3	2	2	2	4	2	2
	23	0	0	0	2	0	0	0	3	0	3
	24	3	3	3	4	3	3	3	3	3	2
	25	4	4	1	3	1	1	1	5	2	2
Total		**79**	**77**	**74**	**72**	**72**	**72**	**71**	**70**	**62**	**42**